



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/772,830	02/05/2004	Calvin T. Gabriel	H1598	6007
45305	7590	10/04/2004	EXAMINER	
RENNER, OTTO, BOISSELLE & SKLAR, LLP (AMDS)			MALSAWMA, LALRINFAMKIM HMAR	
1621 EUCLID AVE - 19TH FLOOR			ART UNIT	PAPER NUMBER
CLEVELAND, OH 44115-2191			2825	

DATE MAILED: 10/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

478

Office Action Summary	Application No. 10/772,830	Applicant(s) GABRIEL, CALVIN T.	
	Examiner Lex Malsawma	Art Unit 2825	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

In line 1 of the abstract, the examiner suggests changing "comprising" to "including".

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chung et al. (6,750,150 B2; hereinafter, "**Chung**") in view of **Trivedi** (6,548,401 B1).

Regarding claims 1-5 and 7:

Chung discloses a semiconductor device processing method, comprising the steps of:

- (a) using a patterned photoresist (PR) 130 to form a structure having at least one edge (Fig. 1 and Col. 3, line 9);

(b) prior to removal of the PR, forming a conforming layer 150 from an organic compound and patterning the conforming layer to form at least one sidewall spacer which is self-aligned to the at least one edge (Figs. 2-3A and Col. 3, lines 21-65);

(c) performing a processing operation which is at least partially localized by the at least side wall spacer (Fig. 3B and Col. 4, lines 16-26); and

(d) removing the PR 130 (Col. 4, lines 31-33), wherein the conforming layer is formed via plasma enhanced chemical vapor deposition (PECVD) at a power ranging from 500 to 800 W utilizing a gaseous C₂ to C₈ fluoro-alkene (Col. 3, lines 51-65), and if necessary, adding hexafluoroethane (Col. 4, lines 10-13). It noted that deposition by PECVD would require gaseous fluoro-alkene.

Chung **lacks** specifically disclosing that at least one sidewall spacer is removed with the PR. However, one of ordinary skill in the art would have readily recognized that the sidewall spacers in Chung's Fig. 3B would most likely be removed before, during, or after the process for removing the PR 130, since there would be essentially no reason for retaining "small protruding sidewall spacers". In any case, Trivedi is **cited to show** that it was very well known in the art to remove sidewall spacers, similar to those utilized by Chung, before proceeding with subsequent process steps. Trivedi discloses (in Figs. 9-10) that a PR pattern 24 and a sidewall spacer 60 formed on the sidewalls of the PR pattern are removed after they have served their purpose (i.e., after the PR pattern 24 and sidewalls 60 have served their purpose). It would have been obvious to one of ordinary skill in the art to modify Chung by specifically reciting that the at least one sidewall spacer is removed with the PR pattern because Trivedi shows that it is typical to remove the sidewall spacers along with the PR pattern before proceeding with subsequent process steps.

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Chung** (in view of **Trivedi**) as applied to claim 5, and further in view of Denton et al. (5,217,749; hereinafter, “**Denton**”).

Regarding claim 6:

Chung (in view of Trivedi) **lacks** specifying any particular range in temperature used during the plasma deposition; however, it is noted that process parameters such as ranges for deposition temperature are generally very well known in the art. Denton is **cited only to show** it was very well known in the art that plasma deposition processes, such as PECVD and glow-discharge polymerization, are typically performed within the currently claimed ranges (note Denton, Col. 1, lines 49 and 58). It would have been obvious to one of ordinary skill in the art to modify Chung (in view of Trivedi) by specifying a deposition temperature ranging from –40 to 400 °C, because Denton show that plasma deposition temperatures typically fall within such a range.

5. Claim 8-12, 14-19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Joyner** (6,228,747 B1) in view of **Mahoney** (4,163,828) and **Chung** (6,750,150 B2).

Regarding claim 8:

Joyner discloses (in Figs. 2A-2F) a method for forming isolation structures, comprising the steps of:

(a) forming a patterned masking layer 230 having at least one edge which overlies a substrate 200 containing a body of semiconductor material;

(b) forming a conforming layer from an organic compound and patterning the conforming layer to form at least one spacer 232 (Fig. 2B) on the at least one edge of the masking layer (note Col. 3, last sentence);

(c) etching the substrate, in areas exposed by the masking layer and the sidewalls, to form said isolation structures (Fig. 2C);

(d) removing the spacers 232 and the patterned masking layer 230 (Fig. 2D);

(e) oxidizing the exposed portions of the semiconductor material (Fig. 2E); and

(f) filling the isolation structures with a dielectric material 214 (Fig. 2F).

Joyner **lacks** specifically disclosing a composition for the conforming “parylene” layer or “other organic material” (note again, Col. 3, last sentence), however, it was well known in the art that parylene comprises compounds similar to those recited in the current claim. Mahoney is **cited only to show** it was well known in the art that “parylene is a generic term applied to the family of unsubstituted and substituted poly-p-xylylenes”, wherein such polymers would include compounds very similar to (in not exactly the same as) those recited in the current claim. In any case, Chung **teaches** a process of forming spacers using an organic compound including a C₂ to C₈ fluoro-alkene (Col. 3, lines 51-65), wherein utilizes the organic sidewall spacer in a manner similar to that disclosed by Joyner. Therefore, given Mahoney and Chung, it would have been obvious to one of ordinary skill in the art modify Joyner by specifically reciting organic compounds similar to (if not understood to be) parylene, because Joyner specifies that the conformal layer can be parylene or other organic material, where Mahoney shows that parylene may very well include the recited compositions and Chung teaches that at least one of the claimed compounds is ideal to incorporate into a process similar to that disclosed by Joyner.

Regarding claims 9-12 and 14:

These claims contain limitations similar to those in claims 2-5 and 7, which were addressed in detail above, i.e., Chung discloses all limitations within these claims. Therefore, these claims are held obvious over the cited references.

Regarding claims 15-19 and 21:

Initially, these claims are directed to an embodiment of the current invention shown in Figs. 6A-6D. Joyner discloses an embodiment in Figs. 3A-3D, which is essentially the same as that of the current invention (depicted in Figs. 6A-6D). As in claim 8 above, the only limitation lacked by Joyner with respect to claim 15 is the limitation for specifically disclosing a composition for the conforming “parylene” layer or “other organic material” (note again, Col. 3, last sentence). All other limitations within claims (15-19 and 21) are contained in claims 8-12 and 13. Therefore, with reasoning similar to those applied above to claims 8-12 and 13, these claims are held obvious over the cited references. NOTE: In Col. 4 (lines 38-40), Joyner specifies that structure 310 may be a transistor structure.

6. Claims 13 and 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Joyner** (in view of **Mahoney**) as applied to claim 12, and further in view of **Denton** (5,217,749).

Regarding claims 13 and 20:

These claims are similar to claim 6, addressed in detail above; accordingly, these claims are held obvious over the cited references with reasoning similar to those applied to claim 6.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The references listed on the attached Form PTO-892 (note cited above) are cited to show methods utilizing sidewall spacers in order to acquire sub-lithographic openings.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lex Malsawma whose telephone number is 571-272-1903. The examiner can normally be reached on Mon-Fri (8 hours between 5:30AM and 8:00 PM EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lex Malsawma



September 28, 2004



MATTHEW SMITH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800